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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

JEFFREY R. BAKER et al.

Group Art Unit: 2832

Examiner: Karl D. Easthorn

Serial No.: 10/067,952

Filed: February 5, 2002

For: Electronic Pressure Sensitive Transducer Apparatus and Method for Manufacturing Same

Attorney Docket No.: INEI 0311 PUSP

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal brief from the final rejection of claims 1-10 and 21-40 of the Office Action dated November 14, 2003. This application was filed on February 5, 2002.

I. REAL PARTY IN INTEREST

The real party in interest is Interlink Electronics, Inc., a corporation organized and existing under the laws of the state of California, and having a place of business at 546 Flynn Road, Camarillo, California 93012, as set forth in the assignment recorded in the U.S. Patent and Trademark Office on February 5, 2002 at Reel 012571/Frame 0687.

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

I hereby certify that this paper, including all enclosures referred to herein, is being deposited with the United States Postal Service as first-class mail, postage pre-paid, in an envelope addressed to: Mail Stop Appeal Brief - Patents, Commissioner for Patents, U.S. Patent & Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 on:

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II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to appellants, the appellants' legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-10 and 21-40 are pending in this application. Claims 1-10 and 21-40 have been rejected and are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No amendments were made in a response mailed January 20, 2004 to the final Office Action dated November 14, 2003. No amendments are pending.

V. SUMMARY OF THE INVENTION

The present invention discloses an electronic pressure sensitive transducer which is constructed directly on a printed circuit board containing support electronics. With reference to a conceptualized cross-sectional view of an embodiment shown in Figure 1 and a partial top view of an embodiment shown in Figure 2, Appellants' invention provides electronic pressure sensitive transducer 20 producing an electrical signal indicative of applied pressure. Transducer 20 includes printed circuit board 22 accepting electronic elements for processing the transducer electrical signal. Conductive traces 24 are formed on printed circuit board 22 to define contact area 26. Flexible substrate 28 has inner surface 30 positioned over contact area 26. Adhesive spacer 34 substantially surrounds contact area 26. Adhesive spacer 34 attaches flexible substrate 28 to printed circuit board 22. At least one resistive layer 32 is deposited on flexible substrate inner surface 30. Resistive layer(s) 32 contact at least two of

traces 24 in response to pressure applied to flexible substrate 28 to produce the electrical signal indicative of applied pressure.

Appellants' invention overcomes problems with prior devices, as described on page 2, lines 11-24, reproduced as follows:

> In most practical applications, the FSR [force sensing resistor] must be connected to sensing and conditioning electronics in order to effectively operate. One way this may be accomplished is by connecting the FSR to a printed circuit board containing the electronics with a multi-conductor cable. Another way of connecting the FSR to support electronics is to adhere the FSR base directly to the circuit board containing the electronics. Electrical connection may be made between traces on the FSR and corresponding traces on the printed circuit board using z-tape, which only conducts in a direction perpendicular to the tape surface. While either method is effective, both have unnecessary manufacturing steps and require unnecessary components, thus increasing the cost of a pressure sensitive transducer system as well as increasing the likelihood of system failure. What is needed is a pressure sensitive transducer and a method for making such a transducer that requires fewer components and fewer manufacturing steps without sacrificing transducer performance.

Appellants fulfilled this need by inventing a pressure sensor that is constructed directly on the same printed circuit board that holds sensor electronics.

VI. ISSUES

In the final Office Action dated November 14, 2003, the Examiner made reference to the following art also argued in this brief:

U.S. Patent No. 4,314,227 to Eventoff (henceforth, Eventoff)

U.S. Patent No. 6,531,951 to Serban *et al.* (henceforth, Serban)

As best understood, Appellants recognize the following issues on appeal in this case:

1. Whether claims 1-3, 5, 8, 9, 21, 22, 24, 27-29, 31, 33, 34, 35, 38 and 39 are anticipated by Eventoff.

2. Whether claims 4, 23 and 32 are unpatentable over Eventoff in view of Serban or Burgess.

VII. GROUPING OF CLAIMS

The following grouping of claims indicates which claims are to stand or fall together. Reasons in support of separately considering each grouping are provided in Section VIII below.

Group A: Claims 1-3, 5-8, 10, 21, 22, 24-27, 30, 31, 33, 35-38 and 40 are grouped together.

Group B: Claims 9, 29 and 39 are grouped together.

Group C: Claims 28 and 34 are grouped together.

Group D: Claims 4, 23 and 32 are grouped together.

VIII. ARGUMENT

Claims 1-10 and 21-40 are pending in this application. In the final Office Action dated November 14, 2003, the Examiner rejected claims 1-3, 5, 8, 9, 21, 22, 24, 27-29, 31, 33, 34, 35, 38 and 39 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,314,227 to Eventoff. The Examiner rejected claims 2, 10, 23, 30 and 40 under 35 U.S.C. § 103(a) as being unpatentable over Eventoff in view of U.S. Patent No. 6,121,869 to Burgess or U.S. Patent No. 6,531,951 to Serban *et al.* The Examiner rejected claims 4, 23 and 32 under 35 U.S.C. § 103(a) as being unpatentable over Eventoff in view of Serban. The Examiner rejected claims 6, 7, 25, 26, 36 and 37 under 35 U.S.C. § 103(a) as being unpatentable over Eventoff in view of U.S. Patent No. 6,087,925 to DeVolpi. Appellants respectfully disagree with the Examiners rejections and request that the Board consider these claims in light of the following arguments.

1. Whether claims 1-3, 5-8, 9, 21, 22, 24-29, 31 and, 33-39 are anticipated by Eventoff

In the final Office Action dated November 14, 2003, the Examiner rejected claims 1-3, 5, 8, 9, 21, 22, 24, 27-29, 31, 33, 34, 35, 38 and 39 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,314,227 to Eventoff. In order to establish a *prima facie* case of anticipation, the Examiner must find a teaching in Eventoff for each element of Appellants' claims. Appellants believe that the Examiner has failed to find such teachings.

A. Claims 1-3, 5-8, 10, 21, 22, 24-27, 30, 31, 33, 35-38 and 40 are not anticipated by Eventoff

Independent claim 1 provides an electronic pressure sensitive transducer producing an electrical signal indicative of applied pressure. The transducer *includes a printed circuit board accepting electronic elements for processing the transducer electrical signal.* Conductive traces are formed on the printed circuit board to define a contact area. A flexible substrate having an inner surface is positioned over the contact area. An adhesive spacer substantially surrounds the contact area for attaching the flexible substrate to the printed circuit board. At least one resistive layer is deposited on the flexible substrate inner surface so as to contact at least two of the traces in response to pressure applied to the flexible substrate and thereby produce the electrical signal indicative of applied pressure.

The Examiner asserts that Appellants' claim 1 is taught by Eventoff, providing the following support at page 2:

> Eventoff discloses the claimed invention at figs. 2 with printed circuit board 12 having room for accepting electronic elements such as the utilization circuit 28 at Fig. 4, ...

Not only does Eventoff fail to disclose such a printed circuit board, Eventoff actively teaches away from any such circuit board.

Figure 2 of Eventoff shows "a cross-sectional plan view of a preferred embodiment of a pressure responsive analog switch ..." (Column 3, lines 48-49.) This embodiment is described in column 5, including lines 1-5, reproduced as follows:

> Referring to FIG. 2, another embodiment of a pressure responsive, variable contact resistance analog switch 10 is illustrated having a base member 12 which may be rigid plastic, flexible Mylar (polyethylene terephthalate) or any other suitable material.

There is no teaching or suggestion that base member 12 can be a printed circuit board accepting electronic elements for processing the transducer electrical signal as provided in claim 1.

Further, the assertion that Eventoff discloses a base member having sufficient room for transducer electronics is shown to be incorrect by Eventoff's Figure 4, described as "a schematic representation of a pressure responsive analog switch with the cover removed shown interconnected to a utilization circuit." (Column 3, lines 54-56.) This figure illustrates that Eventoff's base member 12 is barely large enough to hold the components of switch 10. Further, utilization circuit 28 is shown *separate and distinct from base member 12*. Utilization circuit 28 is connected to components of switch 10 by *first lead 32 and second lead 34, which run off of base member 12 to utilization circuit 28*. Thus, not only does Eventoff not disclose Appellants' invention, Eventoff actively teaches away from constructing electronic elements for processing the transducer electrical signal on the same printed circuit board as are constructed other components of an electronic pressure sensitive transducer.

Further evidence that Eventoff teaches away from Appellants' invention is provided in another embodiment illustrated in Eventoff's Figure 1. The analog switch in Figure 1 is shown with leads 56 and 58 leading away from the switch "to allow for electrical coupling of the analog switch to a utilization circuit." (Column 4, lines 10-12.)

Eventoff, commonly assigned with the application on appeal, is discussed in Appellants' background as one of the force sensing resistors (FSRs) which suffers from an overly complex manufacturing process and unnecessary additional elements at page 1, line 12, through page 2, line 24, reproduced as follows:

> Pressure sensitive transducers generate a signal indicative of the amount of pressure applied to a flexible membrane. Such transducers may also generate a signal based on the location of

pressure applied to the flexible membrane. Such pressure sensitive transducers provide inputs for a wide variety of applications such as remote controls, game controllers, mouse pads, tactile sensors, and the like. Pressure sensitive transducers are typically coupled with electronics that condition and amplify pressure signals.

Various constructions for pressure sensitive transducers are possible. One type includes one or more force sensing resisters (FSRs). Various FSRs have been disclosed, such as those described in commonly assigned U.S. Patent Nos. 4,314,227 [Eventoff]; 4,314,228; and 4,489,302; each of which is hereby incorporated by reference in its entirety. Typically, an FSR is composed of three parts, a rigid base, a spacer, and a resistive membrane. Conductive traces are typically arranged in separated interdigitated sets on the base. These traces may be configured in a single zone or in multiple zones to allow, for example, pointing devices as described in commonly assigned U.S. Patent Nos. 5,659,334 and 5,828,363, each of which is hereby incorporated by reference in its entirety. The flexible resistive membrane is spaced apart from the base layer by a spacer, which is typically a ring of material around the outer edge of the conductive traces. The spacer is also typically coated with adhesive to hold the device together. The flexible top membrane may be made of a polymer coated on its inner face with semi-conductive or resistive ink, giving the FSR force sensing properties. This ink is described in commonly owned U.S. Patent Nos. 5,296,837 and 5,302,936, each of which is hereby incorporated by reference in its entirety.

In most practical applications, the FSR must be connected to sensing and conditioning electronics in order to effectively operate. One way this may be accomplished is by connecting the FSR to a printed circuit board containing the electronics with a multi-conductor cable. Another way of connecting the FSR to support electronics is to adhere the FSR base directly to the circuit board containing the electronics. Electrical connection may be made between traces on the FSR and corresponding traces on the printed circuit board using z-tape, which only conducts in a direction perpendicular to the tape surface. While either method is effective, both have unnecessary manufacturing steps and require unnecessary components, thus increasing the cost of a pressure sensitive transducer system as well as increasing the likelihood of system

> failure. What is needed is a pressure sensitive transducer and a method for making such a transducer that requires fewer components and fewer manufacturing steps without sacrificing transducer performance.

As is evident by the disclosure of Eventoff, Eventoff requires separate and distinct wiring which run from the sensor to utilization electronics on a separate board.

Claim 1 is not anticipated by Eventoff. Nor do Appellants believe that Eventoff can be used as the basis for an obviousness-type rejection as Eventoff teaches away from Appellants' invention. Claims 2-10 depend from claim 1 and are therefore also patentable.

Independent claim 21 provides a printed circuit board electronic pressure sensitive transducer assembly including *a printed circuit board accepting electronic elements for processing pressure transducer electrical signals*. Conductive traces are formed on the printed circuit board to define a contact area. A flexible substrate is positioned over the contact area. An adhesive spacer, substantially surrounding the contact area, attaches the flexible substrate to the printed circuit board. At least one resistive layer including a resistive ink is deposited on an inner surface of the flexible layer. The resistive layer contacts at least two of the contact area conductive traces in response to pressure applied to the flexible substrate.

The Examiner rejected claim 21 as anticipated by Eventoff. As argued above, Eventoff neither teaches nor suggests constructing a pressure sensitive transducer on a printed circuit board accepting electronic elements for processing pressure transducer electrical signals. Claim 21 is therefore not anticipated by Eventoff. Claims 22-30 depend form claim 21 and are therefore also patentable.

Independent claim 31 provides a printed circuit board electronic pressure sensitive transducer assembly *including a printed circuit board accepting electronic elements for processing pressure transducer electrical signals*. Conductive traces are formed on the printed circuit board to define a contact area. A pedestal, substantially surrounding the contact area, forms a flat area higher than the conductive traces. A flexible substrate is positioned over the contact area. An adhesive spacer, substantially surrounding the contact area, attaches

the flexible substrate to the pedestal. At least one resistive layer is deposited on the flexible substrate inner surface. The resistive layer contacts at least two of the contact area conductive traces in response to pressure applied to the flexible substrate.

The Examiner rejected claim 31 as anticipated by Eventoff. As argued above, Eventoff neither teaches nor suggests a pressure sensitive transducer assembly including a printed circuit board accepting electronic elements for processing pressure transducer electrical signals. Claim 31 is therefore not anticipated by Eventoff. Claims 32-40 depend form claim 31 and are therefore also patentable.

B. Claims 9, 29 and 39 are not anticipated by Eventoff

Claims 9, 29 and 39, which depend from claims 1, 21 and 31, respectively, further provide that the conductive traces on the printed circuit board contact area include copper traces covered with an oxidation preventing conductive material. The Examiner asserts that such conductive traces are taught by Eventoff, stating "silver is applied to copper as disclosed at col. 5, lines 40-50, or col. 4, lines 1-10 to form the conductive traces." (Page 2.)

The paragraph including the Examiner's citation of column 4 describes Eventoff's Figure 1 and runs from column 3, line 67, through column 4, line12, reproduced as follows:

> The conductor plate 50 may comprise a flexible support sheet 64, such as Mylar, with a thin conductive layer 66 of silver or other conductive material sprayed, screened or otherwise applied on the surface of the support sheet 64 adjacent the second conductor plate 52. The second conductor plate 52 may comprise a rigid plastic base member 68 with a thin copper surface 70 disposed thereon. Of course, it will be appreciated that the base member 68 may be flexible and the thin surface 70 may be made of silver or other suitable conductive material. A lead 56 and a lead 58 may be coupled to the silver layer 66 and the copper surface 70 respectively to allow for electrical coupling of the analog switch to a utilization circuit.

Eventoff discloses a silver layer 66 on flexible support sheet 64 and a copper surface 70 on base member 68 *opposite of flexible support sheet 64.*

The second reference cited by the Examiner includes text from the paragraph at column 5, lines 43-49, reproduced as follows:

> Referring to FIG. 3, in an alternative embodiment of the invention, the pressure sensitive resistive layer 42 is disposed immediately on top of the contact conductors 13 and a conductor layer 36, such as a very thin layer of silver, is disposed on the surface of the support member facing the resistive layer 42 on the contact conductors 13.

Once again, the silver and copper are on opposite surfaces. Silver conductor layer 36 is disposed on cover 19 and copper conductors 13 are disposed on base member 12. There is no disclosure for placing silver on copper. Thus, Eventoff neither teaches nor suggests Appellants' copper traces covered with an oxidation preventing conductive material.

Claims 9, 29 and 39, grouped together as Group B, should be considered separately from Group A because, even if the claims of Group A are found to be unpatentable, Eventoff neither teaches nor suggests Appellants' copper traces covered with an oxidation preventing conductive material.

C. Claims 28 and 34 are not anticipated by Eventoff

Claims 28 and 34, which depend from claims 21 and 31, respectively, further provide that the adhesive spacer includes adhesive ink. This adhesive ink is disclosed in Appellants' specification at page 7, line 25, through page 8, line 5, reproduced as follows:

> Adhesive 34 is used to attach flexible substrate 28 to printed circuit board 22. Adhesive 34 also provides spacing between resistive layers 32 on substrate 28 and traces 24 on printed circuit board 22. Adhesive 34 may be applied to printed circuit board 22, to flexible substrate 28, or to both as suits manufacturability of FSR 36. Adhesive 34 may be applied to either surface in a conventional manner such as, for example, by depositing a bead of adhesive 34 around some or all of the perimeter of contact area 26. In a preferred embodiment,

> adhesive layer 34 comprises an adhesive ink screen printed onto substrate 28. Adhesive inks that may be used include product numbers SP-7533 from 3M or ML25184 from Acheson Industries, Inc. of Port Huron, Michigan.

The Examiner asserts that Appellants' adhesive ink is taught by Eventoff, stating only that "glue is an adhesive ink for claim 28." (Page 2.) This is not true. The term "glue" is not synonymous with "adhesive ink." For example, it is not possible to screen print a typical form of glue. Eventoff does not teach or fairly suggest Appellants' use of adhesive ink.

Claims 28 and 34, grouped together as Group C, should be considered separately from Groups A and B because, even if the claims of Groups A and B are found to be unpatentable, Eventoff neither teaches nor suggests Appellants' use of adhesive ink.

2. Whether claims 4, 23 and 32 are unpatentable over Eventoff in view of Serban

In the final Office Action dated November 14, 2003, the Examiner rejected claims 4, 23 and 32 under 35 U.S.C. § 103(a) as being unpatentable over Eventoff in view of Serban. Appellants respectfully disagree with the Examiner's rejections.

According to M.P.E.P. § 2142, three criteria must be met for the Examiner to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in Eventoff, Serban or in knowledge generally available to one of ordinary skill in the art, to modify Eventoff. Second, there must be a reasonable expectation that this modification will succeed. Finally, either Eventoff or Serban must teach or suggest all claim limitations. Appellants believe no combination of Eventoff and Serban disclose Appellants' claimed invention.

Claims 4, 23 and 32, which depend from claims 3, 22 and 31, respectively, further provide for a pedestal, substantially surrounding the contact area on the printed circuit board, including a conductive material formed on the printed circuit board coated with a non-conductive material. Appellants' pedestal is illustrated in Figures 1 and 2 and is disclosed on page 9, lines 19-27, as follows:

> Traces 24 and at least a portion of pedestal 38 may be fabricated at the same time and of the same materials. This may result in traces 24 and the base of pedestal 38 extending the same height above board 22. The height of pedestal 38 may be increased by the addition of solder mask or similar material and adhesive spacer 34. This typically will result in a distance between traces 24 and flexible substrate 28 sufficient to prevent inadvertent contact between resistive layer 32 and conductive traces 24. Simultaneous cofabrication of pedestal 38 and traces 24 together with the remainder of circuit board 22 results in very low incremental cost to circuit board 22.

As can be seen in Figure 2, Appellants' pedestal 38 is a large square area extending entirely around contact area 26 except as needed to permit traces 52 to pass through pedestal 38 from contact area 26.

The Examiner admits that Appellants' pedestal is not disclosed by Eventoff. The Examiner relies instead on Serban, providing the following argument on page 3:

> Serban discloses at Figs. 2a-2b the conductors 32, 34 emanating out from under the pedestal 16 so that the traces can communicate with electrical devices or power, such that it would have been obvious to have the pedestal over the traces for that purpose.

The Examiner misconstrues both the meaning of Appellants' claims 4, 23 and 32 and of the teachings of Serban. As can be readily seen in Serban's Figure 1, Serban's separator 16 is not built with a conductor. Serban describes separator 16 in column 4, lines 30-41, as follows:

> The separator may comprise a two-sided adhesive band which is cut so as to surround, at least in part, the active zone 18 of the sensor 10. In a preferred version, on the other hand, the separator comprises an adhesive that is printable, for example, by serigraphy or by spraying, which serves to stick the two supports 12 and 14 together and which is solidified before or after assembly of the supporting sheets. In order to ensure a uniform spacing between the tow supports, separator particles 20 with a diameter substantially equal to the planned spacing between the two supports 12, 14 may be introduced into the adhesive, either before or after its application.

There is no teaching, or even a suggestion, of building a pedestal by forming a conductor on the printed circuit board then coating the conductor with an insulative material.

Apparently realizing this failure of Serban to disclose Appellants' pedestal the Examiner asserts that, since Serban discloses traces 32, 34 leading from active zone 18, Serban inherently discloses building Appellants' pedestal. However, Serban does not disclose that separator 16 covers traces 32, 34. Even if Serban's separator 16 did cover traces 32, 34, this does not disclose Appellants' invention of constructing a pedestal substantially surrounding a contact area with a conductive layer coated by nonconductive layer.

Claims 4, 23 and 32, grouped together as Group D, should be considered separately from Groups A, B and C because, even if the claims of Groups A, B and C are found to be unpatentable, no combination of Eventoff and Serban either teaches or suggests Appellants' pedestal comprised of conductive and nonconductive layers.

The fee of $330 as applicable under the provisions of 37 C.F.R. § 1.17(c) is enclosed. Please charge any additional fee or credit any overpayment in connection with this filing to our Deposit Account No. 02-3978. A duplicate of this notice is enclosed for this purpose.

Respectfully submitted,

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Enclosure - Appendix

IX. APPENDIX - CLAIMS ON APPEAL

1. An electronic pressure sensitive transducer producing an electrical signal indicative of applied pressure, the transducer comprising:

a printed circuit board accepting a plurality of electronic elements for processing the transducer electrical signal;

a plurality of conductive traces formed on the printed circuit board to define a contact area;

a flexible substrate having an inner surface positioned over the contact area;

an adhesive spacer substantially surrounding the contact area, the adhesive spacer attaching the flexible substrate to the printed circuit board; and

at least one resistive layer deposited on the flexible substrate inner surface, the resistive layer contacting at least two of the traces in response to pressure applied to the flexible substrate to produce the electrical signal indicative of applied pressure.

2. An electronic pressure sensitive transducer as in claim 1 wherein at least one resistive layer comprises resistive ink.

3. An electronic pressure sensitive transducer as in claim 1 further comprising a pedestal formed on the printed circuit board substantially around the contact area, the pedestal receiving the adhesive spacer.

4. An electronic pressure sensitive transducer as in claim 3 wherein the pedestal comprises conductive traces covered with a non-conductive material.

5. An electronic pressure sensitive transducer as in claim 1 wherein the plurality of conductive traces comprise:

a plurality of sets of traces, each set of traces interconnected within a zone of the contact area; and

an interconnected set of common traces extending into each zone.

6. An electronic pressure sensitive transducer as in claim 5 wherein at least one interconnected set of traces is connected to the electronic elements for processing the transducer electrical signal via a through-hole in the printed circuit board.

7. An electronic pressure sensitive transducer as in claim 6 wherein the through-hole is within the contact area.

8. An electronic pressure sensitive transducer as in claim 1 wherein conductive traces are arranged in interconnected sets, with at least two sets of traces interdigitated.

9. An electronic pressure sensitive transducer as in claim 1 wherein conductive traces comprise copper traces covered with an oxidation preventing conductive material.

10. An electronic pressure sensitive transducer as in claim 1 wherein conductive traces comprise screen printed carbon ink.

21. A printed circuit board electronic pressure sensitive transducer assembly comprising:

a printed circuit board accepting a plurality of electronic elements for processing pressure transducer electrical signals;

a plurality of conductive traces formed on the printed circuit board to define a contact area;

a flexible substrate having an inner surface positioned over the contact area;

an adhesive spacer substantially surrounding the contact area, the adhesive spacer attaching the flexible substrate to the printed circuit board; and

at least one resistive layer comprising a resistive ink deposited on the flexible substrate inner surface, the resistive layer contacting at least two of the contact area conductive traces in response to pressure applied to the flexible substrate.

22. A printed circuit board electronic pressure sensitive transducer assembly as in claim 21 further comprising a pedestal formed on the printed circuit board, the pedestal substantially surrounding the contact area, the pedestal receiving the adhesive spacer.

23. A printed circuit board electronic pressure sensitive transducer assembly as in claim 22 wherein the pedestal comprises a conductive material coated with a non-conductive material, the conductive material formed on the printed circuit board.

24. A printed circuit board electronic pressure sensitive transducer assembly as in claim 21 wherein the plurality of conductive traces comprise:

a plurality of sets of traces, each set of traces interconnected within a zone of the contact area; and

an interconnected set of common traces extending into each zone.

25. A printed circuit board electronic pressure sensitive transducer assembly as in claim 24 wherein at least one interconnected set of traces is connected to the electronic elements for processing the transducer electrical signal via a through-hole in the printed circuit board.

26. A printed circuit board electronic pressure sensitive transducer assembly as in claim 25 wherein the through-hole is within the contact area.

27. A printed circuit board electronic pressure sensitive transducer assembly as in claim 21 wherein conductive traces are arranged in interconnected sets, with at least two sets of traces interdigitated.

28. An electronic pressure sensitive transducer as in claim 21 wherein the adhesive spacer comprises adhesive ink.

29. A printed circuit board electronic pressure sensitive transducer assembly as in claim 21 wherein conductive traces comprise copper traces covered with an oxidation preventing conductive material.

30. A printed circuit board electronic pressure sensitive transducer assembly as in claim 21 wherein conductive traces comprise screen printed carbon ink.

31. A printed circuit board electronic pressure sensitive transducer assembly comprising:

a printed circuit board accepting a plurality of electronic elements for processing pressure transducer electrical signals;

a plurality of conductive traces formed on the printed circuit board to define a contact area;

a pedestal substantially surrounding the contact area, the pedestal forming a flat area higher than the conductive traces;

a flexible substrate having an inner surface positioned over the contact area;

an adhesive spacer substantially surrounding the contact area, the adhesive spacer attaching the flexible substrate to the pedestal; and

at least one resistive layer deposited on the flexible substrate inner surface, the resistive layer contacting at least two of the contact area conductive traces in response to pressure applied to the flexible substrate.

32. A printed circuit board electronic pressure sensitive transducer assembly as in claim 31 wherein the pedestal is formed by depositing a non-conductive layer over a conductive layer, the conductive layer formed on the printed circuit board.

33. An electronic pressure sensitive transducer as in claim 31 wherein at least one resistive layer comprises resistive ink.

34. An electronic pressure sensitive transducer as in claim 31 wherein the adhesive spacer comprises adhesive ink.

35. A printed circuit board electronic pressure sensitive transducer assembly as in claim 31 wherein the plurality of conductive traces comprise:

a plurality of sets of traces, each set of traces interconnected within a zone of the contact area; and

an interconnected set of common traces extending into each zone.

36. A printed circuit board electronic pressure sensitive transducer assembly as in claim 35 wherein at least one interconnected set of traces is connected to the electronic elements for processing the transducer electrical signal via a through-hole in the printed circuit board.

37. A printed circuit board electronic pressure sensitive transducer assembly as in claim 36 wherein the through-hole is within the contact area.

38. A printed circuit board electronic pressure sensitive transducer assembly as in claim 31 wherein conductive traces are arranged in interconnected sets, with at least two sets of traces interdigitated.

39. A printed circuit board electronic pressure sensitive transducer assembly as in claim 31 wherein conductive traces comprise copper traces coated with an oxidation preventing conductive material.

40. A printed circuit board electronic pressure sensitive transducer assembly as in claim 31 wherein conductive traces comprise screen printed carbon ink.